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EXAMINER	
LEFLORE, LAUREL E	

ART UNIT	PAPER NUMBER
2673	

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/062,441	IISAKA, HIDEHITO	
	Examiner	Art Unit	
	Laurel E LeFlore	2673	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-36 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-36 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 10 July 2002 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-15, 17-20 and 31-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Singhal et al. 6,057,809.

3. In regard to claim 1, Singhal discloses a drive circuit of an electrooptic device that supplies a display portion wherein pixels are constructed in a matrix shape. See column 4, line 12, disclosing a "display matrix". The electrooptic material has a transmission factor for light that is variable by application of a voltage, with an ON voltage capable of saturating the transmission factor or an OFF voltage capable of bringing the pixel into a non-transmissive state. Note that the times of 100 μS or 0μS are the maximum and minimum times, respectively, that a pixel can be on in Singhal's invention. Singhal further explains in the background of the invention, column 2, lines 43-47, "The shade of a pixel is related to the amount of time the pixel is on…the pixel is on for a total of 100 μS…for maximum intensity…or 0μS for minimum intensity." Maximum intensity is understood to saturate the transmission factor and minimum intensity is understood to be a non-transmissive state.

The drive circuit implements a subfield drive in which a gradation is expressed in accordance with states of a light transmissive state and the non-transmissive state of

the pixel in a unit time, and a time ratio of the states. See column 4, lines 35-38, disclosing, "It turns a pixel on and off over a cycle of multiple frames where a gray-scale shade generated is proportional to a total amount of time that a pixel is illuminated during a cycle of multiple frames."

The drive circuit comprises a drive device that sets as control units a plurality of subfields into which a field period is divided on a time base for driving a pixel. See figure 6 and column 6, line 29 to column 7, line 4, disclosing "a 4-frame FRC cycle". Each of these frames are subfields and divide a field of 100μS into subfield times of 17, 20, 27, and 36 μS.

The drive device further sets a time period of each of the subfields to be shorter than a saturation response time which is required for saturating the transmission factor of the electrooptic material in the case of applying the ON voltage. See column 6, lines 52-57, disclosing, "The four combinations where the pixel is on for just one of the four frames (1000), (0100), (0010), and (0001) have total on times of 17, 20, 27, and 36 μS. These appear as gray shades of about 17%, 20%, 27%, and 36% of the full brightness color."

The drive device further determines on the basis of multi-bit display data the subfields for which to apply the ON voltage therein and the subfields for which to apply the OFF voltage therein, thereby to express the gradation per pixel. See column 5, lines 41-46, disclosing, "Each of the 6 possible patterns generated by turning a pixel on for two of the four frames produces a slightly different shade. Likewise, each of the 4 patterns of one pixel-on frame has a different shade, as do each of the four patterns

with a pixel on for three frames. Thus a full 16 shades can be generated from four frames." Further see column 8, lines 12-14, disclosing, "Gray-scale converter 14 converts multi-bit pixel intensities to digital (on or off) pixels."

4. In regard to claim 2, Singhal discloses that the saturation response time of the electrooptic material is shorter than a field period. See rejection of claim 1, disclosing that the saturation response time, or the time it takes for maximum brightness to be attained is 100μs, which means the pixel is ON for all four frames. Further see figure 5 and column 5, lines 51-60, disclosing the "line pulse (LP) to the flat-panel display...For the first horizontal lines shown, the line-pulse period T1 is 900 pixel periods T(PIX). Since 800 pixels are displayed in a line for SVGA resolution, this leaves a horizontal blanking period of 100 pixel-periods." Further see that each of the line-pulse periods (which together make up to a field period of the display data) is composed of pixel display and horizontal blanking periods. Thus, the saturation response time is shorter than a field period, as inherently only the pixel display periods contribute to a pixel reaching maximum brightness.

5. In regard to claim 3, see rejection of claim 1. Singhal further discloses that the drive device sets a time period of each of the subfields to be shorter than a non-transmission response time which is required for shifting the transmission factor of the electrooptic material from a saturated state into the non-transmissive state in the case of applying the OFF voltage. See column 6, lines 51-52, disclosing, "The dimmest (grayest) shade is generated by leaving the pixel off for all four frames (0000), which is on for 0 μS." Thus, the non-transmission response time which is required for shifting

the transmission factor of the electrooptic material from a saturated state into the non-transmissive state is four frames (subfields), and one subfield is shorter.

6. In regard to claim 4, see rejection of claim 2. Note also, in the rejection of claim 1, that the non-transmission response time is also four frames, or 100μs. Thus, again, this time is less than the whole field period of the display data, which further includes blanking periods.

7. In regard to claim 5, Singhal discloses that the drive means applies the ON voltage to the electrooptic material in successive or non-successive subfields so that an integral value of the transmissive state of the electrooptic material in the pertinent field period may correspond to the multi-bit display data. See column 4, lines 28-29, in which Singhal discloses "a frame sequence of row times that are on or off and that integrate to the shade value." Further see the rejection of claim 1 and figure 6, depicting this frame sequence of row times. In figure 6, an ON voltage is a 1.

8. In regard to claim 7, Singhal discloses that the saturation response time is a time period which is not shorter than three subfield periods. See rejection of claim 1. Further see column 6, lines 47-50, disclosing, "The maximum brightness...is attanted (sic) by turning a pixel on for all four frames". Thus the saturation response time is four subfields.

9. In regard to claim 8, Singhal discloses that the non-transmission response time is a time period which is not shorter than three subfield periods. See rejection of claim 3, disclosing that the the non-transmission response time is four subfield periods.

10. In regard to claims 9 and 10, Singhal discloses that the ON voltage is applied to the electrooptic material in concentrated fashion in subfield periods on the lead side of the field period and that the OFF voltage is applied to the electrooptic material in concentrated fashion in subfield periods on the end side of the field period. See figure 6, the gray shade in which the frame values are (1100), which is (ON ON OFF OFF). Also shown are gray shades in which the frame values are (1000) and (1110). These gray shades all have the ON voltage applied in the first subfields (on a lead side of the field period) and the OFF voltage applied in the subfield periods on the end side of the field period.

11. In regard to claim 11, see rejection of claim 1.

12. In regard to claim 12, see rejection of claim 3.

13. In regard to claim 13, see rejection of claim 5.

14. In regard to claim 14, see rejection of claim 1. Further, such a "display matrix" is understood to include an electrooptic material enclosed in intersection areas between a plurality of data and scanning lines.

15. In regard to claims 15 and 17, Singhal discloses an electronic equipment comprising an electrooptic device comprising the drive circuit of an electrooptic device according to claim 1. See rejection of claim 1. Further see column 3, lines 52-53, disclosing as part of the summary of the invention, "a flat-panel graphics controller has a modulated line clock to a flat-panel display". A flat-panel display is an electronic equipment comprising an electrooptic device (the flat panel). Also note that the display is depicted in figure 8.

16. In regard to claim 18, see rejections of claims 1 and 9.

17. In regard to claim 19, Singhal discloses that, in a case where display content changes at changeover of fields in displaying a dynamic picture image, the pulse width of the pulse signals for bringing the pixels into the transmissive states in a later field is altered in accordance with the direction in which the brightness of the screen changes. See rejection of claim 1 and figure 6. As an example look at the 4-frame times of frames (0110) and (1001). When a pixel is brought into a 47% transmissive state, the four frames are (0110) or (OFF ON ON OFF). If the brightness of the screen were then to change to 53%, the four frames would be (1001) or (ON OFF OFF ON). When this happens the duration of the on times in each frame changes; thus, the on pulse width changes from (0μs 20μs 27μs 0μs) in one field to (17μs 0μs 0μs 36μs) in a later field.

18. In regard to claims 20, see rejection of claim 10.

19. In regard to claim 31, see rejection of claims 1, 9 and 10 for similarities. Singhal further discloses that at least one of the subfields in which the pertinent pixel is to be brought into the transmissive state and which are successively arranged in the first half of the pertinent field on the basis of the display data, is brought into a non-transmitting condition. See figure 6, the gray shade in which the frame values are (1000), which is (ON OFF OFF OFF). This gray shade has the second subfield, which is in the first half of the pertinent field, brought into a non-transmitting condition.

20. In regard to claim 32, Singhal discloses that, among the subfields in which the pertinent pixel is to be brought into the transmissive state and which are successively arranged in the first half of the pertinent field on the basis of the multi-bit display data, at

least one subfield other than the subfield where the transmissive state starts but which lies in the vicinity thereof is brought into the non-transmitting condition in conformity with the rules stipulated by the multi-bit display data. See rejection of claim 31.

21. In regard to claim 33, Singhal discloses that, among the subfields in which the pertinent pixel is to be brought into the transmissive state and which are successively arranged in the first half of the pertinent field on the basis of the multi-bit display data, at least one subfield other than the subfield where the transmissive state ends but which lies in the vicinity thereof is brought into the non-transmitting condition in conformity with the rules stipulated by the multi-bit display data. See rejection of claim 31. Further see figure 6, the gray shade in which the frame values are (0100), which is (OFF ON OFF OFF). This gray shade has the first subfield, which is in the first half of the pertinent field, brought into a non-transmitting condition.

Claim Rejections - 35 USC § 103

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

23. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singhal et al. 6,057,809.

24. In regard to claim 6, Singhal discloses an invention similar to that which is disclosed in claim 6. Singhal does not disclose a driving, in his present invention, in

which a plurality of subfields within each field are set at substantially the same time width.

However, Singhal discloses, in the background of the invention, a driving in which the plurality of subfields within each field are set at substantially the same time width. See column 2, lines 43-54, in which each of the subfields has a time of 25μs. Singhal further discloses in column 2, lines 52-55, "A total of five shades can be generated for any pixel" according to such an allocation of 25μs for each subfield, and in lines 55-61, "The gray shade produced does not depend on which of the four frames a pixel is on or off...Since each frame has identical timing, the pixel is on for 25 μs per frame [using the example of one ON and three OFFs], regardless of which frame the pixel is turned on."

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Singhal by having the plurality of subfields within each field set at substantially the same time width, as in the background of Singhal's invention. One would have been motivated to make such a change based on Singhal's teaching that with such a driving "A total of five shades can be generated for any pixel" and "the gray shade produced does not depend on which of the four frames a pixel is on or off...Since each frame has identical timing".

25. Claims 16, 22-24, 26-28, 30 and 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Singhal et al. 6,057,809 in view of Sato et al. 5,712,652.

26. In regard to claim 16, 22, 26 and 34, Singhal discloses an invention similar to that which is disclosed in claims 16, 22, 26 and 34. See rejections of claims 1 and 9 for

similarities. Singhal does not disclose pixels which include pixel electrodes disposed in correspondence with intersections between a plurality of scanning lines and a plurality of data lines, switching elements for controlling voltages to be applied to the respective pixel electrodes, an electrooptic material enclosed in intersection areas between the plurality of data lines and the plurality of scanning lines, and a counter electrode arranged in opposition to the pixel electrodes.

Sato et al. discloses an invention including pixels which include pixel electrodes disposed in correspondence with intersections between a plurality of scanning lines and a plurality of data lines, switching elements for controlling voltages to be applied to the respective pixel electrodes, an electrooptic material enclosed in intersection areas between the plurality of data lines and the plurality of scanning lines, and a counter electrode arranged in opposition to the pixel electrodes. See figure 19 and column 1, lines 40-56, disclosing, "The switching element array substrate 906 is made up of a plurality of data lines 901 and scanning lines 902 both arranged being intersected to each other in a matrix form, a plurality of pixel electrodes 903, a plurality of pixel portion switching elements 904 each connected between the pixel electrode 903 and the data line 901 and controlled by the scanning line 902...The opposing substrate is provided so as to be opposed to the switching element array substrate 906 in such a way that a gap is formed between the pixel electrode 903 and the counter electrode 907, respectively. The liquid crystal layer is formed between the switching element array substrate 906 and the opposing substrate". Sato further teaches in lines 34-35 of column 1 that this is "the construction of the typical prior art liquid crystal display

device". Further see column 2, lines 10-12, disclosing, "the voltage is supplied from the data line 901...via the pixel portion switching element 904".

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Singhal by having pixels which include pixel electrodes disposed in correspondence with intersections between a plurality of scanning lines and a plurality of data lines, switching elements for controlling voltages to be applied to the respective pixel electrodes, an electrooptic material enclosed in intersection areas between the plurality of data lines and the plurality of scanning lines, and a counter electrode arranged in opposition to the pixel electrodes, as in the invention of Sato. One would have been motivated to make such a change, given that Singhal does not disclose a configuration for the pixels of his invention, and according to the teaching of Sato that such a configuration is typical.

27. In regard to claim 23, see rejection of claim 19.

28. In regard to claim 24, see rejection of claim 10.

29. Further in regard to claim 26, Singhal discloses a data line drive circuit which supplies binary signals for designating at least one of an ON voltage and an OFF voltage of the pixels. See column 1, lines 30-33, disclosing, "The analog CRT pixels...are converted to binary digital pixels by a gray-scale converter. The color intensities are converted to on or off pixels."

Further see column 2, lines 3-10 of Sato, disclosing, "In operation, whenever a scanning line 902 is selected by the scan driver circuit 910, the pixel portion switching elements 904 connected to the selected scanning line 902 are set to a conductive state.

At the same time the data line 901 corresponding to the video data is selected by the data driver circuit 909, so that a voltage corresponding to picture data...is applied to the data line 901."

30. In regard to claim 27, see rejection of claim 19.

31. In regard to claim 28, see rejection of claim 10.

32. In regard to claim 30, see rejection of claim 17.

33. Further in regard to claim 34, Singhal discloses that at least one of the subfields in which the pertinent pixel is to be brought into the transmissive state and which are successively arranged may be brought into a non-transmitting condition. See figure 6, the gray shades in which the frame values are (0111), (1011), (1101) and (1110). These gray shades have only one of the subfields in which the pertinent pixel is to be brought into the transmissive state and which are successively arranged brought into a non-transmitting condition. Further, all of the rest of the gray shades depicted in figure 6 have at least one of the subfields in which the pertinent pixel is to be brought into the transmissive state and which are successively arranged brought into a non-transmitting condition.

34. In regard to claim 35, see rejections of claims 26 and 31.

35. In regard to claim 36, see rejection of claim 17.

36. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singhal et al. 6,057,809 in view of Mizutome et al. 6,037,920.

37. In regard to claim 21, Singhal discloses an invention similar to that which is disclosed in claim 21. See rejection of claim 18 for similarities. Singhal does not

disclose that the pulse width of the pulse signals for bringing the pixels into the transmissive-states is altered in each field in accordance with the temperature of the electrooptic material itself or the ambient temperature of the electrooptic material.

Mizutome discloses an invention in which the pulse width of the pulse signals for bringing the pixels into the transmissive-states is altered in each field in accordance with the temperature of the electrooptic material itself or the ambient temperature of the electrooptic material. See column 1, lines 57-67, disclosing "control means for...judging in which of the plural temperature regions the temperature of the liquid crystal device is present based on detected temperature data from the temperature-detection means, and...controlling the drive signal generation means to generate a drive signal having a pulse width varying depending on the detected temperature data."

Mizutome further teaches in column 1, lines 11-21, "In recent years, attention has been called to liquid crystal apparatus using a memory-type liquid crystal...This type of liquid crystal apparatus has an advantage of a large capacity display because of its memory characteristic but is accompanied with a difficulty that the device performance is liable to change on temperature change. Particularly, it is liable to exhibit a large temperature-dependence of optical characteristic during multiplex drive." Further, in column 1, lines 36-41, Mizutome teaches that an object of his invention is "to provide a liquid crystal apparatus having a simple structure yet capable of allowing a sufficient temperature compensation of a liquid crystal device".

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Singhal by having the pulse width of the

pulse signals for bringing the pixels into the transmissive-states altered in each field in accordance with the temperature of the electrooptic material itself or the ambient temperature of the electrooptic material, as in the invention of Mizutome. One would have been motivated to make such a modification based on the teaching of Mizutome that such a configuration would "provide a liquid crystal apparatus having a simple structure yet capable of allowing a sufficient temperature compensation of a liquid crystal device" in a device in which "performance is liable to change on temperature change" and "is liable to exhibit a large temperature-dependence of optical characteristic during multiplex drive".

38. Claims 25 and 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singhal et al. 6,057,809 in view of Sato et al. 5,712,652 as applied to claims 22 and 26 above, and further in view of Mizutome et al. 6,037,920.

39. In regard to claims 25 and 29, see rejection of claim 21.

Response to Arguments

40. Applicant has amended the drawings to overcome the objection to the drawings of the paper dated 8 April 2004. Objection to the drawings is withdrawn.

41. Applicant's arguments filed 6 July 2004 have been fully considered but they are not persuasive.

42. Applicant argues on pages 15-16 of the paper dated 6 July 2004 that "Singhal et al. does not teach a multi-bit gradation data for displaying a gradation per pixel, as claimed". However, as presented in the rejection dated 8 April 2004 and in applicant's arguments on page 16 of the paper dated 6 July 2004, Singhal discloses in column 3,

lines 53-60, "It converts the stream of pixels from a multi-bit-per-color cathode-ray tube (CRT) format to a single-bit-per-color flat panel format". Thus, multi-bit gradation is used as the basis for displaying a gradation per pixel.

Conclusion

43. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laurel E LeFlore whose telephone number is (703) 305-8627. The examiner can normally be reached on Monday-Friday 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala can be reached on (703) 305-4938. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LEL

LEL
15 November 2004

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